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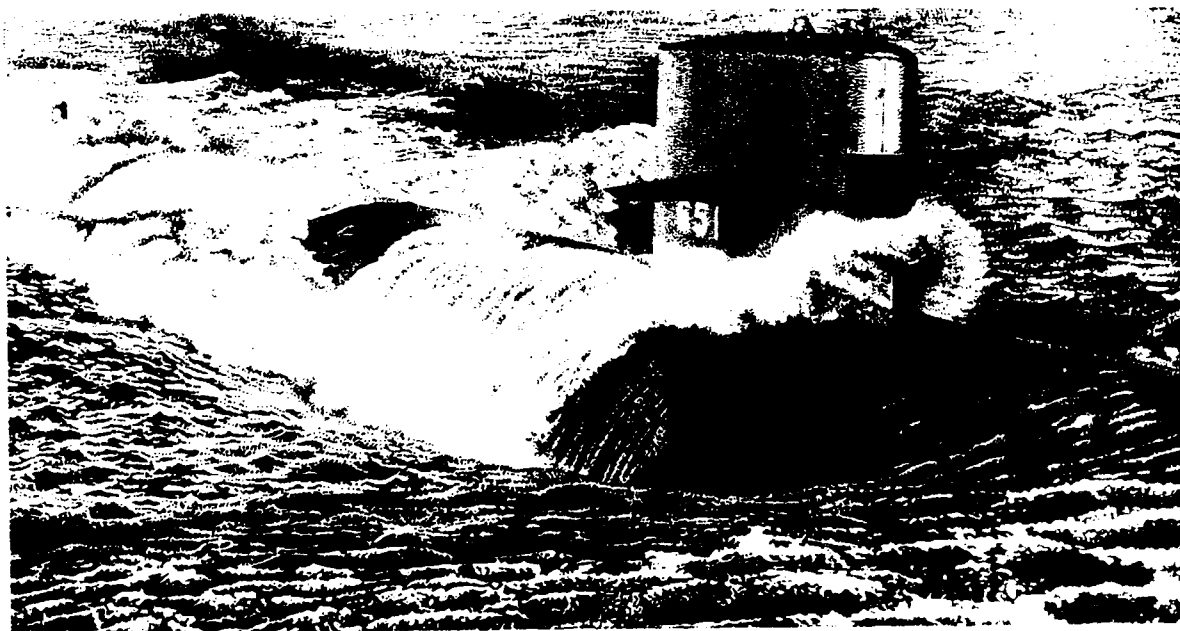
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TECHNOLOGY - WARFARE MATRICES (TWM)

Matrix	Title
2-1	WORKYEARS
3-1	FUNDING
5-1	WORKYEARS, BASIC RESEARCH
5-2	FUNDING, BASIC RESEARCH
5-3	WORKYEARS, EXPLORATORY DEVELOPMENT
5-4	FUNDING, EXPLORATORY DEVELOPMENT
5-5	WORKYEARS, ADVANCED DEVELOPMENT
5-6	FUNDING, ADVANCED DEVELOPMENT
5-7	WORKYEARS, ENGINEERING DEVELOPMENT
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1.0 INTRODUCTION

Ideally, an organization's current situation is best described by a quantitative narrative of client satisfaction. Typical measures of this satisfaction include profit, value added, and return on investment.

NORDA is confronted by two obstacles to this ideal. First, as a Department of the Navy laboratory, NORDA's operating environment comprises a distinctly separate client and sponsor. Our client, the Fleet, and our sponsors, ONR and the SYSCOMs, have different perspectives and goals. The Fleet focuses upon immediate operating concerns, whereas the sponsor searches the technology horizon for future opportunities and hazards. This complex relationship is significant, since strategic decisions are generally influenced by sources of funding, not client satisfaction. Second, as a not-for-profit laboratory, NORDA performance is difficult to quantify in terms of utility or economic value of its products; consequently, performance conventionally is examined relative to resources allocated to it.

1.1 RESOURCES

Resources allocated to any particular Research, Development, Test, and Evaluation (RDT&E) task may include any commodity whose true cost is the penalty cost of not applying that resource to another task. That is, commodity utility is generally time dependent. For simplicity, real property and capital equipment will not be included in this analysis, only labor resources, expressed in workyears, and fiscal resources, expressed in funding, will be examined.

1.2 RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY

Utilizing resource allocation as an indirect measure of performance, a reasonable view of the current situation can be gained by examining the Research and Technology Work Unit Summary (DD form 1498) database. A good overview of the current situation focuses on those efforts performed by or on behalf of NORDA's technical personnel. In the database, these efforts are labeled "INHOUSE". To avoid misleading, short-term fluctuations, at least three years of information should be aggregated, in the present case, 1986-1988. Examination of these official records of NORDA technical activity provides an appropriate indication of resource allocation and should be a significant factor in the formulation of any long-range technical or management strategy.

The value of these documents is twofold. First, they are the same documents available to anyone with access to the Defense Technology Information Center (DTIC) database (i.e. they are the same documents other organizations such as GAO, OMB, and DOD might use to appraise our situation); and second, they are the only documents describing technical work, workyears, and funding, whose veracity is certified by four signatures: 1) Associate Technical Director, 2) Division Head, 3) Branch Head, and 4) Principal Investigator.

In the analysis to follow, the validation date for the NORDA DD form 1498 database is 17 May 1988.

1.3 TECHNOLOGY-WARFARE MATRIX

To be effective, any analysis and subsequent planning of NORDA resource allocation must provide a bridge between the vocabulary and world viewed by the client-sponsor and the vocabulary and world viewed by the technical worker. These two worlds must be linked in a consistent way with resource allocation. The Navy (client-sponsor) understands warfare areas and the scientist-engineer understands technology areas. How are they best linked? One solution is the Technology-Warfare Matrix used here to describe allocation of workyears and funding. This matrix has subsequent value in linear programming to determine an optimum resource allocation mix.

1.3.1 Technology Discipline Parameter

In discussing technology, relative to resource allocation and competing organizations, it is essential to use definitions which are common to universities, government laboratories, and industry. One such set of definitions, used in the DD 1498 database, is the technology code promulgated by the "Subject Categorization Guide For Defense Science And Technology" from DTIC. Of the several hundred technology categories, 31 have been identified with NORDA efforts during the past three years. They are listed in Table 1-1.

TECHNOLOGY CATEGORIES

Table 1-1

<u>Technology Code</u>	<u>Definition</u>
04	<u>ATMOSPHERIC SCIENCES</u>
0401	Atmospheric Physics
06	<u>BIOLOGICAL AND MEDICAL SCIENCES</u>
0606	Ecology
0613	Microbiology
07	<u>CHEMISTRY</u>
0703	Organic Chemistry
08	<u>EARTH SCIENCES AND OCEANOGRAPHY</u>
0801	Biological Oceanography
0802	Cartography and Aerial Photography
0803	Physical and Dynamic Oceanography
0804	Geomagnetism
0805	Geodesy
0807	Geology, Geochemistry, and Mineralogy
0810	Soil Mechanics
0811	Seismology
0812	Snow, Ice, and Permafrost
09	<u>ELECTROTECHNOLOGY AND FLUIDICS</u>
0901	Electrical and Electronic Equipment
12	<u>MATHEMATICAL AND COMPUTER SCIENCE</u>
1205	Computer Programming and Software
1208	Computer Systems Management and Standards
13	<u>MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING</u>
1308	Manufacturing and Industrial Engineering and Control of Production Systems
1310	Marine Engineering
15	<u>MILITARY SCIENCE</u>
1506	Military Operations, Strategy and Tactics
150602	Undersea and Antisubmarine Warfare

Table 1-1 Continued

<u>Technology Code</u>	<u>Definition</u>
17	<u>NAVIGATION, DETECTION, AND COUNTERMEASURES</u>
1701	Acoustic Detection and Detectors
1705	Optical Detection and Detectors
1706	Magnetic and Electric Field Detection and Detectors
1707	Navigation and Guidance
170703	Air Navigation and Guidance
19	<u>ORDNANCE</u>
1908	Underwater Ordnance
20	<u>PHYSICS</u>
2001	Acoustics
2003	Electricity and Magnetism
2004	Fluid Mechanics
2013	Thermodynamics
25	<u>COMMUNICATIONS</u>
2501	Telemetry

These technology category definitions are taken from "Subject Categorization Guide for Defense Science and Technology", DTIC/TR - 86/16, Defense Technical Information Center, October 1986.

1.3.2 Warfare Area Parameter

As mentioned previously, any meaningful analysis of NORDA's utility to the Fleet must be discussed in terms familiar to Navy personnel, that is, warfare areas. The 16 warfare areas commonly used by the Fleet, as defined by Director of Naval Laboratories (DNL), are described in the Glossary. During the past three years, NORDA technical workers were active in the twelve areas shown below. The warfare areas are preceded by their two letter code. Note, "Multiapplication Technology" is sometimes referred to as "Fleet Support Operations".

AS	Anti-Submarine Warfare
AW	Amphibious Warfare
CC	Command, Control, and Communications
EW	Electronic Warfare and Intelligence
MS	Sealift, USMC Support and Other Shore Establishments
MT	Multiapplication Technology
MW	Mine Warfare/Mine Countermeasures
OS	Ocean Surveillance
SL	Support, Logistics, and Underway Replenishment
SW	Special Warfare
TV	Tactical Warfare Ashore/Strike Warfare
WS	Warships

FY 1986 FY 1988
WORKYEARS BY WARFARE AREA AND TECHNOLOGY

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	0 000	0 000	0 000	0 000	0 000	0 900	0 000	0 000	0 000	0 000	0 000	0 000	0 900
0818	1 500	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 500
0819	0 00	0 000	0 000	0 000	0 000	5 200	0 000	0 000	0 000	0 000	0 000	0 000	5 200
0821	0 000	0 000	0 000	0 000	0 000	0 130	0 000	1 300	0 000	0 000	0 000	0 000	1 430
0821	8 700	0 000	0 000	0 000	0 000	2 000	0 000	0 000	0 000	0 000	0 000	0 000	8 700
0822	0 000	3 400	2 000	0 000	7 500	13 800	0 000	0 750	0 000	10 000	22 000	0 000	59 450
0823	39 200	0 000	0 000	0 000	0 000	118 430	3 000	23 720	2 250	5 000	0 000	0 300	191 900
0824	0 000	0 000	0 000	0 000	0 000	4 500	0 000	0 000	0 000	0 500	0 000	0 000	5 000
0825	0 000	0 000	0 000	0 000	0 000	8 550	0 000	0 000	0 000	0 000	0 000	0 000	8 550
0827	8 300	2 000	0 000	0 000	0 000	1 800	1 200	0 500	0 000	0 000	0 000	0 000	13 800
0828	0 180	0 000	0 000	0 000	0 000	0 800	0 000	0 000	0 000	2 300	0 000	0 000	3 080
0829	19 450	0 000	0 000	0 000	0 000	0 200	0 000	0 000	0 000	0 000	0 000	0 000	19 650
0829	0 000	0 000	0 000	0 200	0 000	6 300	0 000	0 110	0 000	0 200	0 000	0 000	6 810
0901	7 700	0 000	0 000	0 000	0 000	6 550	0 300	25 000	0 000	0 000	0 000	0 000	39 550
1205	3 900	0 000	4 000	0 000	0 000	0 000	0 000	1 400	0 000	0 000	0 000	0 000	9 300
1406	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 100	0 000	0 000	0 000	0 000	0 100
1308	0 000	0 000	0 000	0 000	0 000	0 750	0 000	0 000	0 000	0 000	0 000	0 000	0 750
1310	0 050	0 000	0 000	0 000	0 000	0 100	0 000	0 000	0 000	0 000	0 000	1 000	1 150
1506	0 000	0 000	0 000	0 000	0 000	4 000	0 000	0 000	0 000	0 000	0 000	0 000	4 000
150612	6 650	0 000	0 000	0 000	0 000	1 700	0 000	2 500	0 000	0 000	0 000	0 000	10 850
1701	41 570	0 000	0 000	0 000	0 000	5 400	9 400	9 400	0 000	0 000	0 000	0 000	65 770
1705	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 300	0 000	0 000	0 000	0 000	1 300
1706	7 800	0 000	0 000	0 000	0 000	0 000	0 500	0 300	0 000	0 000	0 100	0 000	8 700
1707	0 000	0 000	0 000	0 000	0 000	14 600	1 400	0 000	0 000	0 000	0 000	2 500	18 500
170723	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 200	0 000	0 000	0 000	0 000	1 200
1908	3 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 200	3 200
2001	63 210	0 000	0 000	0 000	0 000	24 700	0 300	7 480	0 000	1 500	0 000	0 000	97 190
2003	0 000	0 000	0 000	0 000	0 000	0 000	1 300	0 500	0 000	4 000	0 000	0 000	5 800
2004	0 950	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 950
2013	0 000	0 000	0 000	0 000	0 000	3 900	0 000	0 000	0 000	0 000	0 000	0 000	3 900
2501	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 500	0 500
TOTAL	210 140	5 400	6 000	0 200	7 500	224 110	17 400	75 560	2 250	23 500	22 100	4 500	598 660

MATRIX 2-1

2.0 TOTAL WORKYEARS

Matrix 2-1 illustrates the construction of a typical technology-warfare resource allocation matrix (TWM). Each row is associated with a particular technology and each column is associated with a particular warfare area. Technologies and warfare areas are identified by their respective codes or symbols. Row or column summation provides aggregated resource allocation for a particular technology or warfare area.

This matrix describes the allocation of total workyears during FY 1986 - FY 1988. Total technical effort for this interval is 598.66 workyears. During this interval, the number of Full Time Personnel (FTP) employed was:

<u>YEAR</u>	<u>FTP</u>
1986	319
1987	334
1988	364

for an aggregate of 1017 FTP. If all personnel were ideally occupied in technical activity, the number of workyears and FTP would be identical (i.e. 100% efficiency); thus, a rough measure of operating efficiency is Workyears/FTP, expressed as a percentage. For NORDA, this value is 58.87%; that is, for every 100 hours of NORDA labor, approximately 40 of those hours are used for nontechnical activity.

2.1 ALLOCATION OF TOTAL WORKYEARS BY TECHNOLOGY AREA

Simple arithmetic in the rightmost column of the matrix (TOTAL) shows that most efforts are concentrated in the following technology areas:

<u>Percent Allocation</u>	<u>Technology Code and Definition</u>	
=====	=====	
9.9%	0802	Cartography and Aerial Photography
32.1%	0803	Physical and Dynamic Oceanography
6.6%	0901	Electrical and Electronic Equipment
11.0%	1701	Acoustic Detection and Detectors
16.1%	2001	Acoustics

Thus, 5 of the 31 technologies comprise 75.8% of the effort; each of the remaining 26 technologies accounts for less than 5% of the total effort.

2.2 ALLOCATION OF TOTAL WORKYEARS BY WARFARE AREA

In like manner, examination of the bottom row (TOTAL) shows most effort is focused on the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
35.1%	AS Anti-Submarine Warfare
37.4%	MT Multiapplication Technology
12.6%	OS Ocean Surveillance

These three warfare areas account for 85.1% of NORDA workyears effort; each of the remaining eight warfare areas accounts for less than 5% of the total.

Thus, NORDA support to the Fleet can be summarized by the definitions of the three predominant warfare areas:

Anti-Submarine Warfare: (AS)	The destruction or neutralization of enemy submarines. This includes the systematic observation of ocean areas to detect, locate, and classify submarines.
Multiapplication Technology: (MT)	An area to be assigned for 6.1 projects and those 6.2/6.3A projects that cannot be readily assigned to any of the above areas. This is not to be assigned to nontechnology-based projects.
Ocean Surveillance: (OS)	Systems and equipment for systematic observation of ocean areas for identification and localization of ships, submarines, and aircraft from fixed and mobile platforms including operational software development, and integration of multisensor, coordinated detection data and its display at appropriate sites.

These three areas will be defined as NORDA principal warfare areas.

Looking back into the matrix, principal technology support to the principal warfare areas is given in percent of workyears allocated to a warfare area:

Technology	AS	MT	OS
0802	0.0%	6.2%	1.0%
0803	18.7%	52.8%	31.4%
0901	3.7%	2.9%	33.1%
1701	19.8%	2.4%	12.4%
2001	30.1%	11.0%	9.9%
TOTAL	72.3%	75.3%	87.8%

For example, the five listed technology areas provide 72.3% of the workyears allocated to Anti-Submarine Warfare (AS).

From a different perspective, the three warfare areas utilize:

24.5% of the workyears allocated to Cartography and Aerial Photography,
 94.5% of the workyears allocated to Physical and Dynamic Oceanography,
 99.2% of the workyears allocated to Electrical and Electronic Equipment,
 85.7% of the workyears allocated to Acoustic Detection and Detectors,
 98.1% of the workyears allocated to Acoustics.

FY 1986 - FY 1988
FUNDING BY WARFARE AREA AND TECHNOLOGY
(Dollars in thousands)

TECHNOLOGY CODE	WARFARE AREA											TOTAL	
	AS	AW	CC	EW	HS	HT	HW	OS	SI	SW	TW		WS
0401	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$100.00
0606	\$130.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$130.00
0813	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$615.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$615.00
0703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$20.00	\$0.00	\$100.00	\$0.00	\$0.00	\$0.00	\$0.00	\$120.00
0801	\$1345.00	\$0.00	\$0.00	\$0.00	\$0.00	\$190.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1535.00
0802	\$0.00	\$723.00	\$200.00	\$0.00	\$1150.00	\$2861.00	\$0.00	\$200.00	\$0.00	\$1490.00	\$3640.00	\$0.00	\$10264.00
0803	\$6805.00	\$0.00	\$0.00	\$0.00	\$0.00	\$17732.00	\$445.00	\$4400.00	\$324.00	\$730.00	\$0.00	\$43.00	\$30479.00
0804	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$565.00	\$0.00	\$0.00	\$0.00	\$720.00	\$0.00	\$0.00	\$1285.00
0805	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1220.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1220.00
0807	\$1300.00	\$360.00	\$0.00	\$0.00	\$0.00	\$393.00	\$150.00	\$128.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2331.00
0810	\$20.00	\$0.00	\$0.00	\$0.00	\$0.00	\$80.00	\$0.00	\$0.00	\$0.00	\$355.00	\$0.00	\$0.00	\$455.00
0811	\$3197.00	\$0.00	\$0.00	\$0.00	\$0.00	\$38.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3235.00
0812	\$0.00	\$0.00	\$0.00	\$100.00	\$0.00	\$784.00	\$0.00	\$20.00	\$0.00	\$25.00	\$0.00	\$0.00	\$909.00
0901	\$2819.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1085.00	\$35.00	\$4047.00	\$0.00	\$0.00	\$0.00	\$0.00	\$7966.00
1205	\$783.00	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00	\$215.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1398.00
1208	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$16.00	\$0.00	\$0.00	\$0.00	\$0.00	\$16.00
1308	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$78.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$78.00
1310	\$50.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$128.00	\$191.00
1506	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$480.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$480.00
150602	\$7416.00	\$0.00	\$0.00	\$0.00	\$0.00	\$165.00	\$0.00	\$365.00	\$0.00	\$0.00	\$0.00	\$0.00	\$7946.00
1701	\$8012.50	\$0.00	\$0.00	\$0.00	\$0.00	\$714.00	\$1695.00	\$1981.00	\$0.00	\$0.00	\$0.00	\$0.00	\$12402.50
1705	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$270.00	\$0.00	\$0.00	\$0.00	\$0.00	\$270.00
1706	\$795.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$75.00	\$30.00	\$0.00	\$0.00	\$40.00	\$0.00	\$940.00
1707	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2487.00	\$437.00	\$0.00	\$0.00	\$0.00	\$0.00	\$375.00	\$3299.00
170703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$167.00	\$0.00	\$0.00	\$0.00	\$0.00	\$167.00
1908	\$575.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$65.00	\$640.00
2001	\$17782.40	\$0.00	\$0.00	\$0.00	\$0.00	\$3264.00	\$50.00	\$1183.00	\$0.00	\$150.00	\$0.00	\$0.00	\$22429.40
2003	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$200.00	\$100.00	\$0.00	\$775.00	\$0.00	\$0.00	\$1075.00
2004	\$116.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$116.00
2013	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$465.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$465.00
2501	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$75.00	\$75.00
TOTAL	\$51145.90	\$1083.00	\$600.00	\$100.00	\$1150.00	\$33309.00	\$3087.00	\$13222.00	\$324.00	\$4245.00	\$3680.00	\$686.00	\$112631.90

MATRIX 3-1

3.0 TOTAL FUNDING

Matrix 3-1 illustrates the technology-warfare resource allocation matrix describing the allocation of total funding during FY 1986 - FY 1988. Values are thousands of dollars (K). Total funding is \$112631.90 K. As mentioned earlier, the aggregate FTP is 1017, so the ratio, Funding/FTP is \$110.75 K per FTP.

3.1 ALLOCATION OF TOTAL FUNDING BY TECHNOLOGY AREA

Similar to the analysis in Section 2.1, Matrix 3-1 shows that funding is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
9.1%	0802 Cartography and Aerial Photography
27.1%	0803 Physical and Dynamic Oceanography
7.1%	0901 Electrical and Electronic Equipment
7.1%	150602 Undersea and Antisubmarine Warfare
11.0%	1701 Acoustic Detection and Detectors
19.9%	2001 Acoustics

Thus, 6 of the 31 technologies account for 81.3% of the funding; each of the remaining 25 technologies account for less than 5% of the total effort. These six technology areas will be defined as NORDA principal technologies; the other 25 technologies will be defined as complementary technologies.

3.2 ALLOCATION OF TOTAL FUNDING BY WARFARE AREA

Examination of the bottom row shows that most funding is allocated to the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
45.4%	AS Anti-Submarine Warfare
29.6%	MT Multiapplication Technology
11.7%	OS Ocean Surveillance

These three warfare areas account for 86.7% of NORDA funding; each of the remaining eight warfare areas account for less than 5% of the total.

Primary technology support, in funding, to the predominant warfare areas is:

Technology	AS	MT	OS
0802	0.0%	0.6%	1.5%
0803	13.3%	53.2%	33.3%
0901	5.5%	3.2%	30.6%
150602	14.5%	0.5%	2.8%
1701	15.7%	2.1%	15.0%
2001	34.8%	9.8%	8.4%
TOTAL	83.8%	69.4%	92.1%

For example, the six listed technology areas provide 83.8% of the funding allocated to Anti-Submarine Warfare (AS).

From a different perspective, the three warfare areas utilize:

29.8% of the funding allocated to Cartography and Aerial Photography,
94.9% of the funding allocated to Physical and Dynamic Oceanography,
99.6% of the funding allocated to Electrical and Electronic Equipment,
100% of the funding allocated to Undersea and Antisubmarine Warfare,
86.3% of the funding allocated to Acoustic Detection and Detectors,
99.1% of the funding allocated to Acoustics.

4.0 COMPARISON OF TOTAL WORKYEARS AND FUNDING

For effective planning, it is useful to examine the relative percentage of workyears and funding to a particular technology or warfare area.

4.1 COMPARISON BY TECHNOLOGY AREA

The following table shows the percentage allocation for workyears and funding by principal technology area.

Workyears	Funding	Technology
9.9%	9.1%	Cartography and Aerial Photography
32.1%	27.1%	Physical and Dynamic Oceanography
6.6%	7.1%	Electrical and Electronic Equipment
1.8%	7.1%	Undersea and Antisubmarine Warfare
11.0%	11.0%	Acoustic Detection and Detectors
16.2%	19.9%	Acoustics

4.2 COMPARISON BY WARFARE AREA

The following table shows the percentage allocation of workyears and funding for the principal warfare areas.

Workyears	Funding	Warfare Area
35.1%	45.4%	Anti-Submarine Warfare (AS)
37.4%	29.6%	Multiapplication Technology (MT)
12.6%	11.7%	Ocean Surveillance (OS)

FY 1986 - FY 1988
WORKYEARS BY WARFARE AREA AND TECHNOLOGY
BASIC RESEARCH (6.1)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	0 000	0 000	0 000	0 000	0 000	0 900	0 000	0 000	0 000	0 000	0 000	0 000	0 900
0606	1 500	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 500
0613	0 000	0 000	0 000	0 000	0 000	4 900	0 000	0 000	0 000	0 000	0 000	0 000	4 900
0703	0 000	0 000	0 000	0 000	0 000	0 130	0 000	1 300	0 000	0 000	0 000	0 000	1 430
0801	1 700	0 000	0 000	0 000	0 000	1 600	0 000	0 000	0 000	0 000	0 000	0 000	3 300
0802	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0803	20 600	0 000	0 000	0 000	0 000	41 490	0 000	4 200	0 000	0 000	0 000	0 000	66 290
0804	0 000	0 000	0 000	0 000	0 000	3 000	0 000	0 000	0 000	0 000	0 000	0 000	3 000
0805	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0807	8 300	0 000	0 000	0 000	0 000	1 800	0 000	0 500	0 000	0 000	0 000	0 000	10 600
0810	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 900	0 000	0 000	1 900
0811	8 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	8 000
0812	0 000	0 000	0 000	0 200	0 000	3 500	0 000	0 000	0 000	0 000	0 000	0 000	3 700
0901	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1205	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1208	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1308	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1310	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1508	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
150802	3 400	0 000	0 000	0 000	0 000	0 700	0 000	2 000	0 000	0 000	0 000	0 000	6 100
1701	15 700	0 000	0 000	0 000	0 000	0 000	4 200	0 000	0 000	0 000	0 000	0 000	19 900
1705	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 800	0 000	0 000	0 000	0 000	0 800
1706	7 800	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	7 800
1707	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
170703	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1908	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2001	9 300	0 000	0 000	0 000	0 000	16 400	0 000	1 000	0 000	1 500	0 000	0 000	28 200
2003	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2004	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2013	0 000	0 000	0 000	0 000	0 000	0 900	0 000	0 000	0 000	0 000	0 000	0 000	0 900
2501	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
TOTAL	76 300	0 000	0 000	0 200	0 000	75 320	4 200	9 800	0 000	3 400	0 000	0 000	169 220

MATRIX 5-1

FY 1986 - FY 1988

FUNDING BY WARFARE AREA AND TECHNOLOGY
(Dollars in thousands)
BASIC RESEARCH (6.1)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	HS	HT	HW	OS	SL	SW	TW	WS	
0401	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$100 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$100 00
0606	\$130 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$130 00
0613	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$565 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$565 00
0703	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$20 00	\$0 00	\$100 00	\$0 00	\$0 00	\$0 00	\$0 00	\$120 00
0801	\$590 00	\$0 00	\$0 00	\$0 00	\$0 00	\$140 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$730 00
0802	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0803	\$3815 00	\$0 00	\$0 00	\$0 00	\$0 00	\$5412 00	\$0 00	\$550 00	\$0 00	\$0 00	\$0 00	\$0 00	\$9777 00
0804	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$415 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$415 00
0805	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0807	\$1300 00	\$0 00	\$0 00	\$0 00	\$0 00	\$393 00	\$0 00	\$128 00	\$0 00	\$0 00	\$0 00	\$0 00	\$1821 00
0810	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$290 00	\$0 00	\$0 00	\$290 00
0811	\$1277 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$1277 00
0812	\$0 00	\$0 00	\$0 00	\$100 00	\$0 00	\$342 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$442 00
0901	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1205	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1208	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1308	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1310	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1508	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
150802	\$390 00	\$0 00	\$0 00	\$0 00	\$0 00	\$100 00	\$0 00	\$300 00	\$0 00	\$0 00	\$0 00	\$0 00	\$790 00
1701	\$2193 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$420 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$2613 00
1705	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$120 00	\$0 00	\$0 00	\$0 00	\$0 00	\$120 00
1706	\$795 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$795 00
1707	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
170703	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1908	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
2001	\$1303 00	\$0 00	\$0 00	\$0 00	\$0 00	\$2125 00	\$0 00	\$91 00	\$0 00	\$150 00	\$0 00	\$0 00	\$3669 00
2003	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
2004	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
2013	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$135 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$135 00
2501	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
TOTAL	\$11793 00	\$0 00	\$0 00	\$100 00	\$0 00	\$9747 00	\$420 00	\$1289 00	\$0 00	\$440 00	\$0 00	\$0 00	\$23789 00

MATRIX 5-2

5.0 RESEARCH, DEVELOPMENT, TEST, AND EVALUATION (RDT&E)

All Department of the Navy efforts must be focused upon implementing both current and future naval strategy. The RDT&E/Acquisition Management Guide clearly states, "The product or output which justifies RDT&E effort is an operational capability." In the interest of management effectiveness, those efforts are linked to program elements, identified in one of ten possible categories:

MAJOR PROGRAMS (preceeded by element code)

- 1 Strategic Forces
- 2 General Purpose Forces
- 3 Intelligence and Communications
- 4 Airlift and Sealift
- 5 Guard and Reserve Forces
- 6 Research and Development
- 7 Central Supply and Maintenance
- 8 Training, Medical, and Other General Personnel Activities
- 9 Administration and Associated Activities
- 0 Support of Other Nations

In particular, RDT&E is concerned with providing the means for advancing the capabilities required to implement the Department of the Navy's overall strategy for the future. This RDT&E process extends from the initial interaction of scientific and technological possibilities with long-range naval capability needs, to definitive systems undergoing development. Simply stated, the objective of RDT&E is operational capability; products or outputs which provide or enhance this capability are the only justification for RDT&E.

Capability is not confined to hardware. The elements of the total system required to provide an operational capability include:

EQUIPMENT - system hardware plus equipment (trainers, support equipment, etc.) required for its effective utilization and support.

PEOPLE - trained crews and maintenance personnel plus the support system required for their continuing development and for training their replacements.

FACILITIES - platforms, structures, etc.

MATERIAL - consumables, spares, etc.

INFORMATION - technical maintenance data, operational tactics, maintenance procedures, etc.

Technical efforts within the RDT&E program fall into six categories:

- 6.1 Research
- 6.2 Exploratory Development
- 6.3 Advanced Development
- 6.4 Engineering Development
- 6.5 Management and Support
- 6.6 Operational Systems Development

NORDA resource allocations will now be examined relative to the first five categories. No program elements exist for 6.6.

5.1 BASIC RESEARCH

This category (6.1), "... includes all effort of scientific study and experimentation directed toward increasing knowledge and understanding in those fields of the physical, engineering, environmental and life sciences related to long-term national security needs. It provides fundamental knowledge required for the solution of military problems. It forms a part of the base for (a) subsequent exploratory and advanced developments in Defense-related technologies, and (b) new and improved military functional capabilities in areas such as communications, detection, tracking, surveillance, propulsion, mobility, guidance and control, navigation, energy conversion, materials and structures, and personnel support." [RDT&E/Acquisition Management Guide, NAVSO P-2457]

Matrix 5-1 and Matrix 5-2 illustrate Basic Research (6.1) resource allocation for workyears and funding, respectively. Aggregate workyears equal 169.22, or 28.3% of the total workyears; aggregate funding is \$23789.00 K, or 21.1% of total funding.

5.1.1 Allocation of Basic Research Workyears by Technology Area

Simple arithmetic in the rightmost column of the matrix shows most effort is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
39.2%	0803 Physical and Dynamic Oceanography
6.3%	0807 Geology, Geochemistry and Mineralogy
11.8%	1701 Acoustic Detection and Detectors
16.7%	2001 Acoustics

Thus, 4 of the 31 technologies comprise 74.0% of the effort; each of the remaining 27 technologies accounts for less than 5% of the total effort.

5.1.2 Allocation of Basic Research Workyears by Warfare Area

In like manner, examination of the bottom row shows most effort is focused on the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
45.1%	AS Anti-Submarine Warfare
44.5%	MT Multiapplication Technology
5.8%	OS Ocean Surveillance

These three warfare areas account for 95.4% of NORDA workyears effort; each of the remaining nine warfare areas accounts for less than 5% of the total.

5.1.3 Allocation of Basic Research Funding by Technology Area

Similar to the analysis in Section 5.1.1, Matrix 5-2 shows funding is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
41.1%	0803 Physical and Dynamic Oceanography
7.7%	0807 Geology, Geochemistry and Mineralogy
5.4%	0811 Seismology
11.0%	1701 Acoustic Detection and Detectors
15.4%	2001 Acoustics

Thus, 5 of the 31 technologies account for 80.6% of the funding; each of the remaining 25 technologies account for less than 5% of the total effort.

5.1.4 Allocation of Basic Research Funding by Warfare Area

Examination of the bottom row shows most funding is allocated to the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
49.6%	AS Anti-Submarine Warfare
41.0%	MT Multiapplication Technology
5.4%	OS Ocean Surveillance

These three warfare areas account for 96.0% of NORDA funding; each of the remaining eight warfare areas accounts for less than 5% of the total.

5.2 EXPLORATORY DEVELOPMENT

This RDT&E category (6.2), "... includes all effort directed toward the solution of specific military problems, short of major development projects. This type of effort may vary from fairly fundamental applied research to quite sophisticated breadboard hardware, study programming and planning efforts. It would thus include studies, investigations, and minor development effort. The dominant characteristic of this category is that it be pointed toward specific military problem areas with a view toward

FY 1986 - FY 1988

WORKYEARS BY WARFARE AREA AND TECHNOLOGY
EXPLORATORY DEVELOPMENT (6 2)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0806	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0813	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0803	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0801	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0812	0 000	0 000	0 000	0 000	0 000	1 200	0 000	0 000	0 000	0 000	0 000	0 000	1 200
0817	7 000	0 000	0 000	0 000	0 000	39 700	0 000	0 000	0 250	0 000	0 000	0 000	46 950
0804	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0805	0 000	0 000	0 000	0 000	0 000	5 050	0 000	0 000	0 000	0 000	0 000	0 000	5 050
0807	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0810	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0811	10 050	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	10 050
0812	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0801	7 300	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	7 300
1205	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1208	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1209	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1310	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1508	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
150602	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 500	0 000	0 000	0 000	0 000	0 500
1701	18 500	0 000	0 000	0 000	0 000	5 300	1 200	8 000	0 000	0 000	0 000	0 000	31 000
1705	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1708	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1707	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
170701	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1908	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2001	19 360	0 000	0 000	0 000	0 000	3 800	0 000	0 000	0 000	0 000	0 000	0 000	23 160
2003	0 000	0 000	0 000	0 000	0 000	0 000	1 300	0 000	0 000	4 000	0 000	0 000	5 300
2004	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2013	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2501	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
TOTAL	60 210	0 000	0 000	0 000	0 000	55 050	2 500	8 500	0 250	4 000	0 000	0 000	130 510

MATRIX 5-3

FY 1986 FY 1988
FUNDING BY WARFARE AREA AND TECHNOLOGY
(Dollars in thousands)
EXPLORATORY DEVELOPMENT (8 2)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0606	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0612	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0707	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0801	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0802	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$100 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$100 00
0807	\$865 00	\$0 00	\$0 00	\$0 00	\$0 00	\$6719 00	\$0 00	\$0 00	\$35 00	\$0 00	\$0 00	\$0 00	\$7719 00
0804	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0805	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$835 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$835 00
0807	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0810	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0811	\$1700 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$1700 00
0812	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0901	\$2660 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$2660 00
1205	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1208	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1308	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1310	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1506	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
150602	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$65 00	\$0 00	\$0 00	\$0 00	\$0 00	\$65 00
1701	\$4531 00	\$0 00	\$0 00	\$0 00	\$0 00	\$704 00	\$125 00	\$1781 00	\$0 00	\$0 00	\$0 00	\$0 00	\$7141 00
1705	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1706	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1707	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
170703	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1808	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
2001	\$4950 00	\$0 00	\$0 00	\$0 00	\$0 00	\$450 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$5400 00
2003	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$200 00	\$0 00	\$0 00	\$775 00	\$0 00	\$0 00	\$975 00
2004	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
2013	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
2501	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
TOTAL	\$14808 00	\$0 00	\$0 00	\$0 00	\$0 00	\$8808 00	\$325 00	\$1846 00	\$35 00	\$775 00	\$0 00	\$0 00	\$26595 00

MATRIX 5-4

developing and evaluating the feasibility and practicability of proposed solutions and determining their parameters. Program control of the Exploratory Development elements will normally be at the mission/warfare level."

[RDT&E/Acquisition Management Guide, NAVSO P-2457]

Matrix 5-3 and Matrix 5-4 illustrate Exploratory Development (6.2) resource allocation for workyears and funding, respectively. Aggregate workyears equal 130.51, or 21.8% of the total workyears; aggregate funding is \$26595.00 K, or 23.6% of total funding.

5.2.1 Allocation of Exploratory Development Workyears by Technology Area

Simple arithmetic in the rightmost column of the matrix shows that most effort is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====	
36.0%	0803	Physical and Dynamic Oceanography
7.7%	0811	Seismology
5.6%	0901	Electrical and Electronic Equipment
23.8%	1701	Acoustic Detection and Detectors
17.7%	2001	Acoustics

Thus, 5 of the 31 technologies comprise 90.8% of the effort; each of the remaining 26 technologies accounts for less than 5% of the total effort.

5.2.2 Allocation of Exploratory Development Workyears by Warfare Area

In like manner, examination of the bottom row shows that most effort is focused on the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====	
46.1%	AS	Anti-Submarine Warfare
42.2%	MT	Multiapplication Technology
6.5%	OS	Ocean Surveillance

These three warfare areas account for 94.8% of NORDA workyears effort; each of the remaining nine warfare areas accounts for less than 5% of the total.

5.2.3 Allocation of Exploratory Development Funding by Technology Area

Similar to the analysis in Section 5.2.1, Matrix 5-4 shows funding is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
29.0%	0803 Physical and Dynamic Oceanography
6.4%	0811 Seismology
10.0%	0901 Electrical and Electronic Equipment
26.9%	1701 Acoustic Detection and Detectors
20.3%	2001 Acoustics

Thus, 5 of the 31 technologies account for 92.6% of the funding; each of the remaining 25 technologies accounts for less than 5% of the total effort.

5.2.4 Allocation of Exploratory Development Funding by Warfare Area

Examination of the bottom row shows most funding is allocated to the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
55.7%	AS Anti-Submarine Warfare
33.1%	MT Multiapplication Technology
6.9%	OS Ocean Surveillance

These three warfare areas account for 95.7% of NORDA funding; each of the remaining eight warfare areas accounts for less than 5% of the total.

5.3 ADVANCED DEVELOPMENT

This category (6.3), "... includes all efforts directed toward projects which have moved into the development of hardware for test. The prime result of this type of effort is proof of design concept rather than the

FY 1986 FY 1988

WORKYEARS BY WARFARE AREA AND TECHNOLOGY
ADVANCED DEVELOPMENT (6.3)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0606	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0613	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0703	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0801	4.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.000
0802	0.000	3.400	2.000	0.000	7.500	6.600	0.000	0.750	0.000	10.000	22.000	0.000	52.250
0803	9.900	0.000	0.000	0.000	0.000	30.000	2.400	18.820	0.000	4.700	0.000	0.300	66.120
0804	0.000	0.000	0.000	0.000	0.000	1.500	0.000	0.000	0.000	0.500	0.000	0.000	2.000
0805	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0807	0.000	2.000	0.000	0.000	0.000	0.000	1.200	0.000	0.000	0.000	0.000	0.000	3.200
0810	0.160	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.660
0811	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.000	0.000	0.000	0.000	0.000	0.200
0812	0.000	0.000	0.000	0.000	0.000	2.800	0.000	0.000	0.000	0.000	0.000	0.000	2.800
0901	0.000	0.000	0.000	0.000	0.000	6.100	0.000	17.900	0.000	0.000	0.000	0.000	24.000
1205	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1208	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1308	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1310	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000
1506	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150602	3.250	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	4.250
1701	4.250	0.000	0.000	0.000	0.000	0.100	0.000	1.400	0.000	0.000	0.000	0.000	5.750
1705	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.500
1706	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1707	0.000	0.000	0.000	0.000	0.000	1.600	0.000	0.000	0.000	0.000	0.000	0.000	1.600
170703	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1908	3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.000
2001	15.800	0.000	0.000	0.000	0.000	0.500	0.000	2.500	0.000	0.000	0.000	0.000	18.800
2003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.500
2004	0.950	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.950
2013	0.000	0.000	0.000	0.000	0.000	3.000	0.000	0.000	0.000	0.000	0.000	0.000	3.000
2501	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL	41.310	5.400	2.000	0.000	7.500	53.900	3.600	42.370	0.000	15.200	22.000	1.300	194.580

MATRIX 5-5

FY 1986 - FY 1988

FUNDING BY WARFARE AREA AND TECHNOLOGY
(Dollars in thousands)
ADVANCED DEVELOPMENT (6.3)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	HS	MT	MW	OS	SL	SW	TW	WS	
0401	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0606	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0613	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0703	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0801	\$620 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$620 00
0802	\$0 00	\$723 00	\$200 00	\$0 00	\$1150 00	\$945 00	\$0 00	\$200 00	\$0 00	\$1490 00	\$3640 00	\$0 00	\$8348 00
0803	\$1815 00	\$0 00	\$0 00	\$0 00	\$0 00	\$4677 00	\$375 00	\$3789 00	\$0 00	\$700 00	\$0 00	\$43 00	\$11379 00
0804	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$150 00	\$0 00	\$0 00	\$0 00	\$720 00	\$0 00	\$0 00	\$870 00
0805	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
0807	\$0 00	\$360 00	\$0 00	\$0 00	\$0 00	\$0 00	\$150 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$510 00
0810	\$20 00	\$0 00	\$0 00	\$0 00	\$0 00	\$80 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$80 00
0811	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$38 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$38 00
0812	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$422 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$422 00
0901	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$1000 00	\$0 00	\$3135 00	\$0 00	\$0 00	\$0 00	\$0 00	\$4135 00
1205	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1208	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1308	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1310	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$128 00	\$128 00
1508	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
150802	\$7028 00	\$0 00	\$0 00	\$0 00	\$0 00	\$65 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$7093 00
1701	\$568 50	\$0 00	\$0 00	\$0 00	\$0 00	\$10 00	\$0 00	\$200 00	\$0 00	\$0 00	\$0 00	\$0 00	\$778 50
1705	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$150 00	\$0 00	\$0 00	\$0 00	\$0 00	\$150 00
1706	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1707	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$241 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$241 00
170703	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
1908	\$575 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$575 00
2001	\$8784 00	\$0 00	\$0 00	\$0 00	\$0 00	\$75 00	\$0 00	\$350 00	\$0 00	\$0 00	\$0 00	\$0 00	\$9209 00
2003	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$100 00	\$0 00	\$0 00	\$0 00	\$0 00	\$100 00
2004	\$118 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$118 00
2013	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$330 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$330 00
2501	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00	\$0 00
TOTAL	\$19522 50	\$1083 00	\$200 00	\$0 00	\$1150 00	\$8013 00	\$525 00	\$7904 00	\$0 00	\$2910 00	\$3640 00	\$171 00	\$45118 50

MATRIX 5-6

development of hardware for service use. Projects in this category have a potential military application."

[RDT&E/Acquisition Management Guide, NAVSO P-2457]

Matrix 5-5 and Matrix 5-6 illustrate Advanced Development (6.3) resource allocation for workyears and funding, respectively. Aggregate workyears equal 192.98, or 32.2% of the total workyears; aggregate funding is \$44877.50 K, or 39.8% of total funding.

5.3.1 Allocation of Advanced Development Workyears by Technology Area

Simple arithmetic in the rightmost column of the matrix shows that most effort is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
27.1%	0802 Cartography and Aerial Photography
34.3%	0803 Physical and Dynamic Oceanography
12.4%	0901 Electrical and Electronic Equipment
9.7%	2001 Acoustics

Thus, 4 of the 31 technologies comprise 83.5% of the effort; each of the remaining 27 technologies accounts for less than 5% of the total effort.

5.3.2 Allocation of Advanced Development Workyears by Warfare Area

In like manner, examination of the bottom row shows that most effort is focused on the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
21.4%	AS Anti-Submarine Warfare
27.1%	MT Multiapplication Technology
22.0%	OS Ocean Surveillance
7.9%	SW Special Warfare
11.4%	TW Tactical Warfare Ashore/Strike Warfare

These five warfare areas account for 89.8% of NORDA workyears effort; each of the remaining seven warfare areas accounts for less than 5% of the total.

5.3.3 Allocation of Advanced Development Funding by Technology Area

Similar to the analysis in Section 5.3.1, Matrix 5-6 shows that funding is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
18.6%	0802 Cartography and Aerial Photography
25.4%	0803 Physical and Dynamic Oceanography
9.2%	0901 Electrical and Electronic Equipment
15.8%	150602 Undersea and Antisubmarine Warfare
20.5%	2001 Acoustics

Thus, 5 of the 31 technologies account for 89.5% of the funding; each of the remaining 26 technologies accounts for less than 5% of the total effort.

5.3.4 Allocation of Advanced Development Funding by Warfare Area

Examination of the bottom row shows that most funding is allocated to the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
43.5%	AS Anti-Submarine Warfare
17.3%	MT Multiapplication Technology
17.6%	OS Ocean Surveillance
6.5%	SW Special Warfare
8.1%	TW Tactical Warfare Ashore/Strike Warfare

These five warfare areas account for 93.0% of NORDA funding; each of the remaining eight warfare areas accounts for less than 5% of the total.

FY 1986 - FY 1988
WORKYEARS BY WARFARE AREA AND TECHNOLOGY
ENGINEERING DEVELOPMENT (6 4)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
C401	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0606	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0612	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0703	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0801	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0802	0 000	0 000	0 000	0 000	0 000	5 000	0 000	0 000	0 000	0 000	0 000	0 000	5 000
0803	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0804	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0805	0 000	0 000	0 000	0 000	0 000	3 500	0 000	0 000	0 000	0 000	0 000	0 000	3 500
0807	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0810	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0811	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0812	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0901	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1205	0 000	0 000	4 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	4 000
1208	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1308	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1310	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1508	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
150802	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1701	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1705	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1706	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1707	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
170703	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1908	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2001	0 900	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 900
2003	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2004	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2013	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2501	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
TOTAL	0 900	0 000	4 000	0 000	0 000	8 500	0 000	0 000	0 000	0 000	0 000	0 000	13 400

MATRIX 5-7

FY 1986 FY 1988
FUNDING BY WARFARE AREA AND TECHNOLOGY
(Dollars in thousands)
ENGINEERING DEVELOPMENT (6 4)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0606	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0613	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0801	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0802	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1699.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1699.00
0803	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0804	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0805	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$385.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$385.00
0807	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0810	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0811	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0812	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0901	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1205	\$0.00	\$0.00	\$400.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$400.00
1208	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1308	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1310	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1506	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
150602	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1701	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1705	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1706	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1707	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
170703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1908	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2001	\$80.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$80.00
2003	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2004	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2013	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2501	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
TOTAL	\$80.00	\$0.00	\$400.00	\$0.00	\$0.00	\$2084.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2564.00

MATRIX 5-8

5.4 ENGINEERING DEVELOPMENT

Effort here (6.4), "... includes those development programs in full-scale development for Service use but which have not received approval for production or had production funds included in the DOD budget submission for the budget or subsequent fiscal year. This area is characterized by major line item projects and program control by review of individual projects."

[RDT&E/Acquisition Management Guide, NAVSO P-2457]

Matrix 5-7 and Matrix 5-8 illustrate Engineering Development (6.4) resource allocation for workyears and funding, respectively. Aggregate workyears equal 13.40, or 2.2% of the total workyears; aggregate funding is \$2564.00 K, or 2.3% of total funding.

5.4.1 Allocation of Engineering Development Workyears by Technology Area

Simple arithmetic in the rightmost column of the matrix shows that most effort is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
37.3%	0802 Cartography and Aerial Photography
26.1%	0805 Geodesy
29.9%	1205 Computer Programming and Software
6.7%	2001 Acoustics

Thus, 4 of the 31 technologies account for 100% of the effort.

5.4.2 Allocation of Engineering Development Workyears by Warfare Area

In like manner, examination of the bottom row shows that most effort is focused on the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
6.7%	AS Anti-Submarine Warfare
63.4%	MT Multiapplication Technology
29.9%	CC Command, Control, and Communications

These three warfare areas account for 100% of NORDA workyears effort.

5.4.3 Allocation of Engineering Development Funding by Technology Area

Similar to the analysis in Section 5.4.1, Matrix 5-8 shows that funding is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
66.3%	0802 Cartography and Aerial Photography
15.0%	0805 Geodesy
15.6%	1205 Computer Programming and Software

Thus, 3 of the 31 technologies account for 96.9% of the funding; each of the remaining 28 technologies account for less than 5% of the total effort.

5.4.4 Allocation of Engineering Development Funding by Warfare Area

Examination of the bottom row shows that most funding is allocated to the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
15.6%	CC Command, Control, and Communications
81.3%	MT Multiapplication Technology

Thus, two warfare areas account for 96.9% of NORDA funding; each of the remaining 11 warfare areas accounts for less than 5% of the total.

5.5 MANAGEMENT AND SUPPORT

This category (6.5), ". . . includes support of installations or operations required for general research and development use. Included would be test ranges, military construction, maintenance support of laboratories, operations and maintenance of test aircraft and ships, and studies and analyses in support of the R&D program. Cost of laboratory personnel, either in-house or contract-operated, would be assigned to appropriate projects or as a line item in the Research, Engineering Development, or Advance Development Program areas, as appropriate. Military construction costs directly related to a major development program will be included in the appropriate element."

[RDT&E/Acquisition Management Guide, NAVSO P-2457]

FY 1986 - FY 1988
WORKYEARS BY WARFARE AREA AND TECHNOLOGY
MANAGEMENT AND SUPPORT (6 5)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	NW	OS	SL	SW	TW	WS	
0401	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0606	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0613	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0703	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0801	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0802	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0803	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0804	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0805	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0807	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0810	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0811	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0812	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0901	0 000	0 000	0 000	0 000	0 000	0 450	0 000	0 000	0 000	0 000	0 000	0 000	0 450
1205	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1208	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1308	0 000	0 000	0 000	0 000	0 000	0 750	0 000	0 000	0 000	0 000	0 000	0 000	0 750
1310	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1506	0 000	0 000	0 000	0 000	0 000	4 000	0 000	0 000	0 000	0 000	0 000	0 000	4 000
150602	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1701	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1705	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1706	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1707	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 700	1 700
170703	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1908	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2001	5 300	0 000	0 000	0 000	0 000	0 000	0 000	1 380	0 000	0 000	0 000	0 000	6 680
2002	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2004	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2013	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2501	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
TOTAL	5 300	0 000	0 000	0 000	0 000	5 200	0 000	1 380	0 000	0 000	0 000	1 700	13 580

MATRIX 5-9

FY 1986 - FY 1988
FUNDING BY WARFARE AREA AND TECHNOLOGY
(Dollars in thousands)
MANAGEMENT AND SUPPORT (6 5)

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0606	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0613	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0801	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0802	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0803	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0804	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0805	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0807	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0810	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0811	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0812	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0901	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$65.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$65.00
1205	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1208	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1308	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$78.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$78.00
1310	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1508	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$480.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$480.00
150802	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1701	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1705	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1706	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1707	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$235.00	\$235.00
170703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1908	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2001	\$722.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$155.00	\$0.00	\$0.00	\$0.00	\$0.00	\$877.00
2003	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2004	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2013	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2501	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
TOTAL	\$722.00	\$0.00	\$0.00	\$0.00	\$0.00	\$623.00	\$0.00	\$155.00	\$0.00	\$0.00	\$0.00	\$235.00	\$1735.00

MATRIX 5-10

Matrix 5-9 and Matrix 5-10 illustrate Management and Support (6.5) resource allocation for workyears and funding, respectively. Aggregate workyears equal 7.88, or 1.3% of the total workyears; aggregate funding is \$1020.00 K, or 0.9% of total funding.

5.5.1 Allocation of Management and Support Workyears by Technology Area

Simple arithmetic in the rightmost column of the matrix shows that most effort is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
5.7%	0901 Electrical and Electronic Equipment
9.5%	1308 Manufacturing and Industrial Engineering and Control of Production Systems
84.8%	2001 Acoustics

Thus, 3 of the 31 technologies account for 100% of the effort.

5.5.2 Allocation of Management and Support Workyears by Warfare Area

In like manner, examination of the bottom row shows most effort is focused on the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
67.3%	AS Anti-Submarine Warfare
15.2%	MT Multiapplication Technology
17.5%	OS Ocean Surveillance

These three warfare areas account for 100% of NORDA workyears effort.

5.5.3 Allocation of Management and Support Funding by Technology Area

Similar to the analysis in Section 5.5.1, Matrix 5-10 shows funding is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
6.4%	0901 Electrical and Electronic Equipment
7.6%	1308 Manufacturing and Industrial Engineering and Control of Production Systems
86.0%	2001 Acoustics

Thus, 3 of the 31 technologies account for 100% of the funding.

5.5.4 Allocation of Management and Support Funding by Warfare Area

Examination of the bottom row shows that most funding is allocated to the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
70.8%	AS Anti-Submarine Warfare
14.0%	MT Multiapplication Technology
15.2%	OS Ocean Surveillance

Thus, three warfare areas account for 100% of NORDA funding.

FY 1986 FY 1988
 WORKYEARS BY WARFARE AREA AND TECHNOLOGY
 NON-RTD/E EFFORTS

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	NW	OS	SL	SW	TW	WS	
0401	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0606	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0613	0 000	0 000	0 000	0 000	0 000	0 300	0 000	0 000	0 000	0 000	0 000	0 000	0 300
0703	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0801	1 000	0 000	0 000	0 000	0 000	0 400	0 000	0 000	0 000	0 000	0 000	0 000	1 400
0802	0 000	0 000	0 000	0 000	0 000	1 000	0 000	0 000	0 000	0 000	0 000	0 000	1 000
0803	1 700	0 000	0 000	0 000	0 000	7 240	0 600	0 700	2 000	0 300	0 000	0 000	12 540
0804	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0805	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0807	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
0810	0 000	0 000	0 000	0 000	0 000	0 100	0 000	0 000	0 000	0 400	0 000	0 000	0 500
0811	1 400	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 400
0812	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 110	0 000	0 200	0 000	0 000	0 310
0901	0 400	0 000	0 000	0 000	0 000	0 000	0 300	7 100	0 000	0 000	0 000	0 000	7 800
1205	3 900	0 000	0 000	0 000	0 000	0 000	0 000	1 400	0 000	0 000	0 000	0 000	5 300
1208	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 100	0 000	0 000	0 000	0 000	0 100
1308	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1310	0 050	0 000	0 000	0 000	0 000	0 100	0 000	0 000	0 000	0 000	0 000	0 000	0 150
1506	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
150602	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1701	5 120	0 000	0 000	0 000	0 000	0 000	4 000	0 000	0 000	0 000	0 000	0 000	9 120
1705	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
1706	0 000	0 000	0 000	0 000	0 000	0 000	0 500	0 300	0 000	0 000	0 100	0 000	0 900
1707	0 000	0 000	0 000	0 000	0 000	13 000	1 400	0 000	0 000	0 000	0 000	0 800	15 200
170703	0 000	0 000	0 000	0 000	0 000	0 000	0 000	1 200	0 000	0 000	0 000	0 000	1 200
1908	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 200	0 200
2001	12 550	0 000	0 000	0 000	0 000	4 000	0 300	2 800	0 000	0 000	0 000	0 000	19 450
2003	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2004	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2013	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000
2501	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 000	0 500	0 500
TOTAL	26 120	0 000	0 000	0 000	0 000	26 140	7 100	13 510	2 000	0 900	0 100	1 500	77 370

MATRIX 6-1

FY 1986 FY 1988

FUNDING BY WARFARE AREA AND TECHNOLOGY
(Dollars in thousands)
NON-RDT&E EFFORTS

TECHNOLOGY CODE	WARFARE AREA												TOTAL
	AS	AW	CC	EW	MS	MT	MW	OS	SL	SW	TW	WS	
0401	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0606	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0813	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$50.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$50.00
0703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0801	\$135.00	\$0.00	\$0.00	\$0.00	\$0.00	\$50.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$185.00
0802	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$117.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$117.00
0813	\$210.00	\$0.00	\$0.00	\$0.00	\$0.00	\$924.00	\$70.00	\$81.00	\$289.00	\$30.00	\$0.00	\$0.00	\$1804.00
0804	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0815	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0817	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
0810	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$20.00	\$0.00	\$0.00	\$0.00	\$65.00	\$0.00	\$0.00	\$85.00
0811	\$220.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$220.00
0812	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$20.00	\$0.00	\$25.00	\$0.00	\$0.00	\$45.00
0901	\$159.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35.00	\$912.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1106.00
1205	\$783.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$215.00	\$0.00	\$0.00	\$0.00	\$0.00	\$998.00
1208	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$16.00	\$0.00	\$0.00	\$0.00	\$0.00	\$16.00
1308	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1310	\$50.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$63.00
1506	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
150802	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1701	\$722.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1150.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1872.00
1705	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
1706	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$75.00	\$30.00	\$0.00	\$0.00	\$40.00	\$0.00	\$145.00
1707	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2246.00	\$437.00	\$0.00	\$0.00	\$0.00	\$0.00	\$140.00	\$2823.00
170703	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$167.00	\$0.00	\$0.00	\$0.00	\$0.00	\$167.00
1908	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$65.00	\$65.00
2001	\$1943.40	\$0.00	\$0.00	\$0.00	\$0.00	\$614.00	\$50.00	\$587.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3194.40
2003	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2004	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2013	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
2501	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$75.00	\$75.00
TOTAL	\$4222.40	\$0.00	\$0.00	\$0.00	\$0.00	\$4034.00	\$1817.00	\$2028.00	\$289.00	\$120.00	\$40.00	\$280.00	\$12830.40

MATRIX 6-2

6.0 OTHER EFFORTS

NORDA also allocates time and money to technical efforts not within the scope of RDT&E. This section examines those efforts.

Matrix 6-1 and Matrix 6-2 illustrate non-RDT&E resource allocation for workyears and funding, respectively. Aggregate workyears equal 62.17, or 10.4% of the total workyears; aggregate funding is \$10007.40 K, or 8.9% of total funding.

6.1 WORKYEARS

6.1.1 Allocation of Non-RDT&E Workyears by Technology area

Simple arithmetic in the rightmost column of the matrix shows that most effort is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
20.2%	0803 Physical and Dynamic Oceanography
12.5%	0901 Electrical and Electronic Equipment
8.5%	1205 Computer Programming and Software
14.7%	1701 Acoustic Detection and Detectors
31.3%	2001 Acoustics

Thus, 5 of the 31 technologies account for 87.2% of the effort; each of the remaining 26 technologies accounts for less than 5% of the total allocation.

6.1.2 Allocation of Non-RDT&E Workyears by Warfare Area

In like manner, examination of the bottom row shows that most effort is focused on the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
42.0%	AS Anti-Submarine Warfare
21.1%	MT Multiapplication Technology
9.2%	MW Mine Warfare/Mine Countermeasures
21.7%	OS Ocean Surveillance

These four warfare areas account for 94.0% of NORDA workyears effort.

6.2 FUNDING

6.2.1 Allocation of Non-RDT&E Funding by Technology Area

Similar to the analysis in Section 6.1, Matrix 6-2 shows that funding is concentrated in the following technology areas:

Percent Allocation =====	Technology Code and Definition =====
16.0%	0803 Physical and Dynamic Oceanography
11.1%	0901 Electrical and Electronic Equipment
10.0%	1205 Computer Programming and Software
18.7%	1701 Acoustic Detection and Detectors
31.9%	2001 Acoustics

Thus, 5 of the 31 technologies account for 87.7% of the funding; each of the remaining 26 technologies accounts for less than 5% of the total effort.

6.2.2 Allocation of Non-RDT&E Funding by Warfare Area

Examination of the bottom row shows that most funding is allocated to the following warfare areas:

Percent Allocation =====	Warfare Code and Definition =====
42.2%	AS Anti-Submarine Warfare
17.9%	MT Multiapplication Technology
13.8%	MW Mine Warfare/Mine Countermeasures
20.3%	OS Ocean Surveillance

Thus, four warfare areas account for 94.2% of NORDA funding; each of the remaining 11 warfare areas accounts for less than 5% of the total.

7.0 WORKYEARS AND FUNDING SUMMARY

During the 3 year interval, 1986-1988, NORDA committed its resources to various technology areas and warfare areas, as shown in the following tables. Principal technology and principal warfare areas are defined as those areas that allocate at least 5% of total resources.

7.1 RESOURCE ALLOCATION BY TECHNOLOGY AREA

Table 7-1 reveals the percentage allocation for workyears and funding by principal technology area (as defined by DTIC).

Resource Allocation
Table 7-1

Workyears	Funding	Technology (DTIC Code)
9.9%	9.1%	Cartography and Aerial Photography (0802)
32.1%	27.1%	Physical and Dynamic Oceanography (0803)
6.6%	7.1%	Electrical and Electronic Equipment (0901)
1.8%	7.1%	Undersea and Antisubmarine Warfare (150602)
11.0%	11.0%	Acoustic Detection and Detectors (1701)
16.2%	19.9%	Acoustics (2001)

7.2 RESOURCE ALLOCATION BY WARFARE AREA

Table 7-2 shows the percentage allocation of workyears and funding for the principal warfare areas (as defined by DNL).

Resource Allocation
Table 7-2

Workyears	Funding	Warfare Area
35.1%	45.4%	Anti-Submarine Warfare (AS)
37.4%	29.6%	Multiapplication Technology (MT)
12.6%	11.7%	Ocean Surveillance (OS)

7.3 RESOURCE ALLOCATION BY RDT&E PROGRAM CATEGORY

Table 7-3 summarizes workyear and funding (\$K) resource allocation by program category. With 87% of workyears and 89% of funding allocated to RDT&E, there is little doubt as to NORDA's mission.

Resource Allocation
Table 7-3

Workyears Funding
(wy) (fd)

Total Effort

data	entries	wy_total	fd_total
AGGREGATE	387	598.660	\$112631.90

Basic Research (6.1)

data	entries	wy_61	fd_61
6.1	107	169.220	\$23789.00
Percent of Total		28.3%	21.1%

Exploratory Development (6.2)

data	entries	wy_62	fd_62
6.2	50	130.510	\$26595.00
Percent of Total		21.8%	23.6%

Advanced Development (6.3)

data	entries	wy_63	fd_63
6.3	134	194.580	\$45118.50
Percent of Total		32.5%	40.1%

Resource Allocation
Table 7-3 Continued

Workyears Funding
(wy) (fd)

Engineering Development (6.4)

data	entries	wy_64	fd_64
6.4	5	13.400	\$2564.00
Percent of Total		2.2%	2.3%

Management and Support (6.5)

data	entries	wy_65	fd_65
6.5	13	13.580	\$1735.00
Percent of Total		2.3%	1.5%

Non-RDT&E

data	entries	wy_other	fd_other
OTHER	78	77.370	\$12830.40
Percent of Total		12.9%	11.4%

Partitioning resource allocation by program element category, Table 7-4 and Table 7-5 depict the distribution of workyears and funding, respectively. These two tables can be used to examine (1) technology mix within a particular program element category, and (2) technology transition policy.

SUMMARY FOR WORKYEARS ALLOCATION

Table 7-4

Technology Code	Program Element Category					
	6.1	6.2	6.3	6.4	6.5	Other
0802	0.0	0.9	26.9	37.3	0.0	1.3
0803	39.2	36.0	34.0	0.0	0.0	16.2
0805	0.0	3.9	0.0	26.1	0.0	0.0
0807	6.3	0.0	1.6	0.0	0.0	0.0
0811	4.7	7.7	0.1	0.0	0.0	1.8
0901	0.0	5.6	12.3	0.0	3.3	10.1
1205	0.0	0.0	0.0	29.9	0.0	6.9
1308	0.0	0.0	0.0	0.0	5.5	0.0
1506	0.0	0.0	0.0	0.0	29.5	0.0
150602	3.6	0.4	2.2	0.0	0.0	0.0
1701	11.8	23.8	3.0	0.0	0.0	11.8
1707	0.0	0.0	0.8	0.0	12.5	19.6
2001	16.7	17.7	9.7	6.7	49.2	25.1
Percent Allocation	82.3%	96.0%	90.6%	100%	100%	92.8%

This table lists those technology codes where either workyears or funding equal or exceed 5% of the total resource allocation for any program element category.

SUMMARY FOR FUNDING ALLOCATION

Table 7-5

Technology Code	Program Element Category					
	6.1	6.2	6.3	6.4	6.5	Other
0802	0.0	0.4	18.5	66.3	0.0	0.9
0803	41.1	29.0	25.2	0.0	0.0	12.5
0805	0.0	3.1	0.0	15.0	0.0	0.0
0807	7.7	0.0	1.1	0.0	0.0	0.0
0811	5.4	6.4	0.1	0.0	0.0	1.7
0901	0.0	10.0	9.2	0.0	3.7	8.6
1205	0.0	0.0	0.0	15.6	0.0	7.8
1308	0.0	0.0	0.0	0.0	4.5	0.0
1506	0.0	0.0	0.0	0.0	27.7	0.0
150602	3.3	0.2	15.7	0.0	0.0	0.0
1701	11.0	26.9	1.7	0.0	0.0	14.6
1707	0.0	0.0	0.5	0.0	13.5	22.0
2001	15.4	20.3	20.4	3.1	50.5	24.9
Percent Allocation	83.9%	96.3%	92.4%	100%	100%	93.0%

This table lists those technology codes where either workyears or funding equal or exceed 5% of the total resource allocation for any program element category.

GLOSSARY AND ACRONYMS

WARFARE AREA DEFINITIONS (defined by Director of Navy Laboratories)

Sea-Based Strategic Warfare: (SB)	Attacks launched from the sea using submarine-launched ballistic missiles
Anti-Air Warfare: (AA)	The destruction of enemy air platforms and airborne weapons, whether launched from air, surface, subsurface, or land platforms. This includes observation of ocean areas to detect, locate, and classify aerospace targets.
Anti-Submarine Warfare: (AS)	The destruction or neutralization of enemy submarines. This includes the systematic observation of ocean areas to detect, locate, and classify submarines.
Anti-Ship Warfare: (SH)	The destruction or neutralization of enemy surface combatants and merchant ships. This includes the systematic observation of ocean areas to detect, locate, and classify surface targets.
Mine Warfare/ Mine Countermeasures: (MW)	Control or denial of sea or harbor areas through the laying of minefields and countering enemy mine warfare through the destruction or neutralization of hostile minefields.
Amphibious Warfare: (AW)	Attacks, launched from the sea by naval forces and by landing forces embarked in ships or craft, designed to achieve a landing on a hostile shore. It includes fire support of troops in contact with enemy forces.

Tactical Warfare Ashore/
Strike Warfare:
(TW/ST)

The destruction or neutralization of enemy targets ashore through the use of conventional or nuclear weapons.

Special Warfare:
(SW)

Naval operations generally accepted as non-conventional in nature - many cases clandestine in character. It includes special mobile operations, coastal and river interdiction, beach and coastal reconnaissance, and certain tactical intelligence operations.

Personnel/Medical
and Training:
(PN)

The endeavors associated with the anatomical, biological, psychological and physiological aspects of humans. It also pertains to measures necessary for protection, training, and support of human resources.

Support, Logistics and
Underway Replenishment:
(SL)

The resupply of combat consumables to combat forces in the theater of operations. It deals with movement, maintenance, supply and support of naval forces afloat and ashore.

Sealift, USMC Support
and Other
Shore Establishments:
(MS)

The movement of combat equipment from ship-to-shore, shore-to-shore, or shore-to-ship in support of an amphibious assault. May be waterborne or airborne movement.

Command-Control and
Communications:
(CC)

The means to effectively exercise the authority and direction of naval forces in the accomplishment of their mission. It entails the coordinated operation among U.S. and Allied forces at sea-based, land-based and space-based naval/national/other services Command Centers and surveillance systems.

Warships:

(WS)

The design, testing, modification, and increasing seaworthiness of combatant ships (i.e., aircraft carriers, surface combatants, patrol combatants, amphibious warfare ships, attack submarines and mine warfare ships.

Electronic Warfare
and Intelligence:

(EW)

The use of electromagnetic energy to determine, exploit, reduce, or prevent hostile use of the electromagnetic spectrum. Also, the assessment and management of information to produce timely indication of enemies and other areas of interest.

Multiapplication
Technology:

(MT)

An area to be assigned for 6.1 projects and those 6.2/6.3A projects that cannot be readily assigned to any of the above areas. This is not to be assigned to nontechnology-base projects.

Ocean Surveillance:

(OS)

Systems and equipment for systematic observation of ocean areas for identification and localization of ships, submarines, and aircraft from fixed and mobile platforms including operational software development, and integration of multisensor, coordinated detection data and its display at appropriate sites.

ACRONYMS

\$B	Dollars in Billions
\$K	Dollars in Thousands
\$M	Dollars in Millions
AA	Anti-air Warfare
AAUS	Active Adjunct Undersea System
ACAT	Acquisition Category
ADP	Automatic Data Processing
AEAS	ASW Environmental Acoustic Support
AFF	Approval for Full Production
AIS	Annual Inspection Summary
APN	Aircraft Procurement, Navy
AS	Antisubmarine Warfare
AW	Amphibious Warfare
BGMS	Battle Group Multistatic Sonar
BUMED	Bureau of Medicine and Surgery
CC	Command, Control, and Communications
CNO	Chief of Naval Operations
CNR	Chief of Naval Research
CO	Commanding Officer
CRREL	Cold Regions Research and Engineering Laboratory
DARPA	Defense Advanced Research Projects Agency
DDN	Defense Data Network
DEIS	Defense Energy Information System
DMA	Defense Mapping Agency
DNL	Director of Naval Laboratories
DOD	Department of Defense
DSS	Distributed Surveillance System
DTAGS	Deep Towed Array Geophysical System
EPA	Extended Planning Annex
EW	Electronic Warfare and Intelligence
FBM	Fleet Ballistic Missile
FED	Federal
FNOC	Fleet Numerical Oceanographic Center
FOC	Fleet Operational Capability
FSU	Florida State University
FY	Fiscal Year
FYDP	Five-Year Defense Plan
GS/GM	General Schedule/General Merit
I/H	In-House
IED	Independent Exploratory Development
INO	Institute of Naval Oceanography
IOC	Initial Operational Capability
IR	Independent Research
IR&D	Independent Research and Development
ITR	Information Technology Resources
M(2)	Maintenance Exceeding \$100,000
MBTU	Million British Thermal Units
MC&G	Mapping, Charting, and Geodesy
MILCON	Military Construction
MOA	Memorandum of Agreement
MS	Sealift, USMC Support & Other Shore Establishments
MT	Multiapplication Technology

MW	Mine Warfare & Mine Countermeasures
MWR	Morale, Welfare, and Recreational
NAPDID	Nonacoustic Program Definition Document
NARDAC	Navy Regional Data Automation Centers
NATO	North Atlantic Treaty Organization
NAVAIR	Naval Air Systems Command
NAVAIRDEVCEEN	Naval Air Development Center
NAVDAC	Navy Data Automation Command
NAVFAC	Naval Facilities Engineering Command
NAVOCEANO	Naval Oceanographic Office
NAVSEA	Naval Sea Systems Command
NAVSUP	Naval Supply Systems Command
NCEL	Naval Civil Engineering Laboratory
NEPRF	Naval Environmental Prediction Research Facility
NICRAD	Navy/Industry Cooperative Research and Development
NIF	Navy Industrial Funding
NME	Naval Material Establishment
NOA	New Obligation Authority
NOP	Naval Oceanography Project
NORDA	Naval Ocean Research and Development Activity
NPGS	Naval Postgraduate School
NRL	Naval Research Laboratory
NROSS	Navy Remote Ocean Sensing System
NTIC	Navy Technical Intelligence Center
O&MN	Operation and Maintenance, Navy
O/H	Out-of-House
OATD	Ocean Acoustics and Technology Directorate
OCNR	Office of the Chief of Naval Research
ONAS	Office of Naval Acquisition Support
ONL	Office of Naval Laboratories
ONR	Office of Naval Research
ONT	Office of Naval Technology
OPEVAL	Operational Evaluation
OPN	Other Procurement, Navy
OPT	Outyear Planning Thrusts
OS	Ocean Surveillance
OSAIS	Oceanographic Support for ASW Initiative Systems
OSD	Ocean Science Directorate
OSHA	Occupational Safety and Health Administration
P-Number	Project Number
PA	Product Area
PLAN	NORDA Strategic Plan
PN	Personnel/Medical & Training
POM	Program Objectives Memorandum
PV	Plant Value
PY	Program Year
R&D	Research and Development
RDT&E	Research, Development, Test, and Evaluation
RDT&E,N	Research, Development, Test, & Evaluation, Navy
RO	Research Option
RPM	Research Planning Memorandum
RPPG	CNR Research Policy and Planning Guidance
S&E	Scientists and Engineers
SASS	Submarine Acoustic Search System
SB	Sea-Based Strategic Warfare

SCN	Shipbuilding and Conversion, Navy
SECNAV	Secretary of the Navy
SEM	Subelement Monitor
SES	Senior Executive Service
SH	Antiship Warfare
SL	Support, Logistics, and Underway Replenishment
SPAWAR	Space and Naval Warfare Systems Command
SSC	Stennis Space Center
STILO	Science and Technology Intelligence Liaison Office
SW	Special Warfare
SYSCOMS	Systems Commands
T/S/N	Technology/Systems/Non-R&D
TAC D&E	Tactical Development and Evaluation
TECHEVAL	Technical Evaluation
TESS	Tactical Environmental Support System
TW/ST	Tactical Warfare Ashore/Strike Warfare
UMC	Urgent Minor Construction
URI	University Research Initiative
USMC	United States Marine Corps
WG	Wage Grade
WPN	Weapon Procurement, Navy
WS	Warships
WY	Workyear
XBT	Expendable Bathythermograph